

WHAT IS CLAIMED IS:

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Q4
1. An isolated polynucleotide comprising a polynucleotide selected from:
 - a) a polynucleotide comprising at least 20 contiguous bases selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - c) a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - d) a polynucleotide complementary to a polynucleotide of (a) through (c).
 2. A recombinant expression cassette comprising a polynucleotide selected from the group consisting of:
 - a) a polynucleotide comprising at least 20 contiguous bases selected SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - c) a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - d) a polynucleotide complementary to a polynucleotide of (a) through (c).
 3. A vector comprising a recombinant expression cassette comprising a polynucleotide selected from the group consisting of:
 - a) a polynucleotide comprising at least 20 contiguous bases selected SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - c) a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - d) a polynucleotide complementary to a polynucleotide of (a) through (c).
 4. A host cell comprising a recombinant expression cassette comprising a polynucleotide selected from the group consisting of:

a) a polynucleotide comprising at least 20 contiguous bases selected SEQ ID NOS: 35, 37, 39, 41, 43, and 45;

b) a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;

c) a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and

d) a polynucleotide complementary to a polynucleotide of (a) through (c).

5. The host cell of Claim 4 wherein the cell is a plant cell

6. The host cell of Claim 5 wherein the cell is selected from the group consisting of maize, sorghum, wheat, tomato, soybean, alfalfa, sunflower, canola, cotton, and rice.

7. A transformed plant comprising a polynucleotide selected from the group consisting of:

a) a polynucleotide comprising at least 20 contiguous bases selected SEQ ID NOS: 35, 37, 39, 41, 43, and 45;

b) a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;

c) a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and

d) a polynucleotide complementary to a polynucleotide of (a) through (c).

8. A plant seed comprising a polynucleotide selected from the group consisting of:

a) a polynucleotide comprising at least 20 contiguous bases selected SEQ ID NOS: 35, 37, 39, 41, 43, and 45;

b) a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;

c) a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and

d) a polynucleotide complementary to a polynucleotide of (a) through (c).

9. A method of reducing pathogenicity of a fungus producing fumonisin or a structurally related mycotoxin, comprising:

- a) transforming a plant cell with a vector comprising a polynucleotide selected from the group consisting of:
 - i. a polynucleotide comprising at least 20 contiguous bases selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - ii. a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - iii. a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - iv. a polynucleotide complementary to a polynucleotide of i. through iii. operably linked to a promoter;
- b) growing the plant cell under plant growing conditions; and
- c) inducing expression of said polynucleotides for a time sufficient for amounts of the fumonisin esterase and APAO enzymes to accumulate to levels that can inhibit the fungus.

10. A method of making an APAO enzyme comprising the steps of:

- a) expressing a polynucleotide in a recombinantly engineered cell, wherein the polynucleotide is selected from the group consisting of:
 - i. a polynucleotide comprising at least 20 contiguous bases selected SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - ii. a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - iii. a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - iv. a polynucleotide complementary to a polynucleotide of i. through iii. operably linked to a promoter;
- and
- b) purifying the enzyme.

11. A method of making an APAO enzyme comprising the steps of:
- a) expressing a polynucleotide in a plant, wherein said polynucleotide is selected from the group consisting of:
 - i. a polynucleotide comprising at least 20 contiguous bases selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - ii. a polynucleotide comprising at least 70% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - iii. a polynucleotide comprising at least 80% sequence identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - iv. a polynucleotide complementary to a polynucleotide of i. through iii. operably linked to a promoter;
 - and
 - b) purifying the enzyme from the plant seed or other plant parts.

12. An isolate polynucleotide comprising a polynucleotide selected from:
- a) a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - c) a polynucleotide complementary to a polynucleotide of (a) through (b).

13. A recombinant expression cassette comprising a polynucleotide selected from the group consisting of:
- a) a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - c) a polynucleotide complementary to a polynucleotide of (a) through (b).

14. A vector comprising a recombinant expression cassette comprising a polynucleotide selected from the group consisting of:
- a) a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - c) a polynucleotide complementary to a polynucleotide of (a) through (b).
15. A host cell comprising a recombinant expression cassette comprising a polynucleotide selected from the group consisting of:
- a) a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - c) a polynucleotide complementary to a polynucleotide of (a) through (b).
16. The host cell of Claim 15 wherein the cell is a plant cell
17. The host cell of Claim 16 wherein the cell is selected from the group consisting of maize, sorghum, wheat, tomato, soybean, alfalfa, sunflower, canola, cotton, and rice.
18. A transformed plant comprising a polynucleotide selected from the group consisting of:
- a) a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
 - b) a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
 - c) a polynucleotide complementary to a polynucleotide of (a) through (b).
19. A plant seed comprising a polynucleotide selected from the group consisting of:
- a) a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;

~~b)~~ a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and

~~c)~~ a polynucleotide complementary to a polynucleotide of (a) through (b).

20. A method of reducing pathogenicity of a fungus producing fumonisin or a structurally related mycotoxin, comprising:

a) transforming a plant cell with a vector comprising a polynucleotide selected from the group consisting of:

- i. a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
- ii. a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
- iii. a polynucleotide complementary to a polynucleotide of (a) through (b).

b) growing the plant cell under plant growing conditions; and

c) inducing expression of said polynucleotides for a time sufficient for amounts of the fumonisin esterase and APAO enzymes to accumulate to levels that can inhibit the fungus.

21. A method of making an APAO enzyme comprising the steps of:

a) expressing a polynucleotide in a recombinantly engineered cell, wherein the polynucleotide is selected from the group consisting of:

- i. a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
- ii. a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
- iii. a polynucleotide complementary to a polynucleotide of (a) through (b).

and

- b) purifying the enzyme.

22. A method of making an APAO enzyme comprising the steps of:

a) expressing a polynucleotide in a plant, wherein said polynucleotide is selected from the group consisting of:

- i. a polynucleotide which hybridizes under high stringency conditions to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45;
- ii. a polynucleotide comprising at least 90% identity to a polynucleotide selected from SEQ ID NOS: 35, 37, 39, 41, 43, and 45; and
- iii. a polynucleotide complementary to a polynucleotide of (a) through (b).

and

- b) purifying the enzyme from the plant seed or other plant part.